"STANDARDIZATION OF TT&C SYSTEMS TO REDUCE OPERATIONS COST - CASE STUDY"

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Abstract

The National Aeronautics and Space Administration (NASA) supports unmanned space missions through a Deep Space Network (DSN) that is developed and operated by the Jet Propulsion Laboratory (JPL) and its subcontractors. The DSN capabilities have been incrementally upgraded since its establishment in the late '50s and are delivered from three Deep Space Communications Complexes (DSCC's) near Goldstone, California, Madrid, Spain, and Canberra, Australia. At present each DSCC includes large antennas with diameters from 11 meters to 70 meters, that operate largely in S-band and X-band frequencies. In addition each DSCC includes all the associated electronics to receive and process the weak telemetry signals, and to radiate the necessary commands with high-power transmitters. To contain operations cost (better still - reduce it where possible), streamline support, and facilitate the rapid increase in the number and variety of deep-space missions that are being supported at present and projected for the foreseeable future, JPL is proceeding on a three-pronged approach:

1. *Installing modern, commercially based, TT&C systems and subsystems.*

2. *Removing older, non-standard TT&C systems from the DSCCs, that has accumulated over the last 30 years, while working with on-going and new missions to transition to more standard interfaces.*

3. *Establishing a set of standard interfaces, to streamline the processes of requesting, providing, and accounting for mission support and working within the CCSDS framework to make these standards international.*

In this paper we outline the DSN plans in the TT&C area that will result in a complete modernization of the TT&C electronics by 2004. Then, we focus on the telemetry area to illustrate some of the unexpected obstacles faced throughout this overhaul. Finally, we quantify some of the equipment reduction and operations simplification elements (Rack count, pre-cal time, etc) that contribute to the expected 50% reduction in DSN operations cost compared to FY97.

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